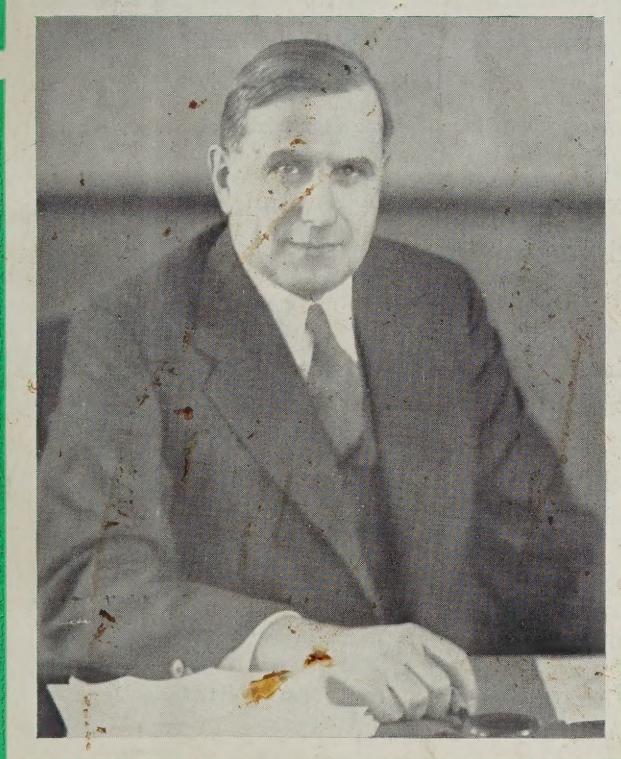


BRITISH COLUMBIA PUBLIC WORKS



HON. FRANK M. MACPHERSON

FROM THE COLLECTION
OF T. D. KILPATRICK
VANCOUVER, B.C.

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Fraser Valley
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JOURNAL OF THE DEPARTMENT OF PUBLIC WORKS

OCTOBER, 1939

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VICTORIA, B.C.:

Printed by CHARLES F. BANFIELD, Printer to the
King's Most Excellent Majesty.
1939.

Ladies and Gentlemen of the Public Works Department:

I regret it is impossible for me to thank each of you personally for the splendid service you have rendered British Columbia during my regime as Minister of Public Works.

I deeply appreciate the friendly and loyal spirit you have always shown. I take with me very cordial and happy memories of you all.

Please accept my best wishes for your future prosperity and happiness.

To Honourable Frank MacPherson:

In the name of all employees of the Public Works Department we extend to you greetings.

During your tenure of office as our Minister you have created a renascence in our activities which will continue and grow long after you assume the important duties of your new appointment.

In leaving us you take with you our very high regard and affection.

We wish you and yours peace, happiness, and prosperity.

Au Revoir.

THE PEACE ARCH HIGHWAY

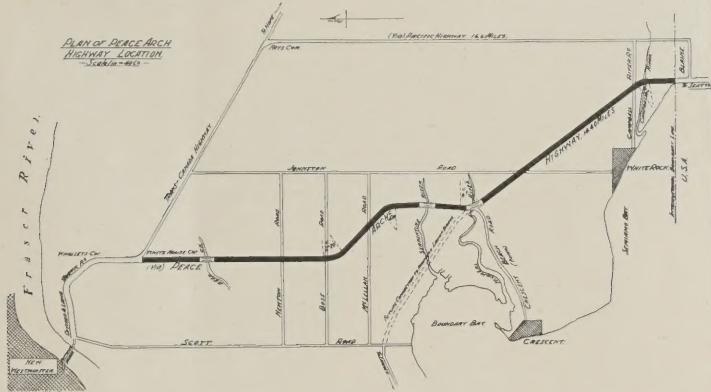
Alternative Route to the Pacific Highway to the International Border Near Completion

By H. C. ANDERSON, District Engineer, Court-house, New Westminster

FOR some years past there has been considerable agitation on the part of the general public for a better highway connection between Vancouver and the International Border. The section complained of most was the Pacific Highway from New Westminster to Blaine. Many suggestions and plans have been advanced as to how this should be done.

People also became road-conscious and improvement of highways took place generally, with a result that during the summer months a large part of the population spend their vacation periods on wheels.

These are the factors which developed the demand for an improved road connection to the U.S. Boundary from Vancouver.



The present road was completed in 1923 and was considered a fine piece of highway and adequate for traffic requirements for many years to come. The opening of the pavement at that time completed a paved road from Canada to the American Border, a dream of many road enthusiasts of that time.

It is of interest here to mention that automobile registrations in the Province in 1923 totalled 39,723, an increase of 9,000 registrations from three years previous; yet three years following the opening of the pavement the registrations had reached 67,000, and now the total is approximately 110,000. The ratio of increase in the United States is similar. While this increase in the use of "gas buggies" was taking place, a big change in transportation methods was also taking place. The local movement of crops, commodities, and passengers passed largely from the railways to the highways, bringing the development of the large freight and passenger vehicles seen on the road to-day.

Considerable study was spent by the Department's engineers on the problem, and it was finally decided to construct an alternative route on modern lines to relieve the congestion on the Pacific Highway. This was the birth of the Peace Arch Highway.

The accompanying plan shows better than words the location of the new highway. The maximum curvature is $4^{\circ} 20'$ and maximum gradient 7 per cent. (1,000 feet only), as compared with approximately 35° curvature and 11-per-cent. grades on the existing Pacific Highway.

The construction of the Peace Arch Highway was one of the dreams of the late Samuel Hill, the great American road enthusiast, and the highway derives its name from the "Peace Arch" constructed at the International Border by Mr. Hill, and the four-lane divided highway at this point passes on either side of the Arch.

The first section of the road to be constructed was from the International Border to the Campbell River

Road, a distance of 1 mile. This gave access to the Douglas Customs Port from the Pacific Highway via Campbell River Road. The next work done on this project was in 1930, when camps for the assistance of single unemployed were established. Progress was slow, due to the use of hand methods only, but the construction was about 80 per cent. completed as far as the Nicomekl River.

The Nicomekl River is the point where the road would branch for Vancouver via the proposed Ladner Bridge or via New Westminster.

With the construction of the Patullo Bridge, the Department undertook to provide the improved road the public had so long clamored for.

The surveys and design were carefully checked and brought up to date with modern practice, and in 1938 the work was undertaken in earnest.

The four-lane divided highway leading from the Pattullo Bridge to where the Peace Arch Highway commences is described elsewhere.

Right-of-way was purchased to provide for four-lane pavement construction in the future, but the road-bed being constructed at the present time provides for two lanes of traffic only.

The standard section adopted was 38 feet from shoulder to shoulder in cuts with 4 to 1 slopes from the edge of the shoulder to the bottom of the drainage ditches, which are all a minimum of 2 feet below grade and 2 feet (minimum) in width. The cut slopes are a minimum of $1\frac{1}{2}$ to 1. Fill section provides for a road-bed 40 feet in width. On the only long grade, one-half mile in length, which is all in cut, the road-bed section is 66 feet in width to allow for a three-lane pavement, the extra lane being provided for passing on the adverse grade so that there will be no congestion of traffic due to slow-moving vehicles. All curves are spiraled and super-elevated for a speed of 40 miles per hour.

The drainage structures through the highway are of reinforced concrete pipe set in concrete cradles and completed with standard wing-walls.

(Continued on page 7)

AGASSIZ-HAIG

My Tour Along The Missing Link in The Lower Fraser Valley Scenic Loop

By E. H. VERNER, District Engineer

A STRETCH of 20 miles of unfinished highway about 80 miles east of Vancouver in the Fraser Valley Delta to-day holds the secret of one of British Columbia's most scenic beauty spots.

Nature has endowed this westerly Province with a wealth of scenery that is unsurpassed by any other spot in the world and, bearing this in mind and the fact that the main bulk of our population is in the confines of the lower Fraser Delta, we should stress the enormous value that would be derived from constructing this piece of road.

The "missing link" of a circular tour from Vancouver through the delta to Hope, B.C., and return is yet a trail—situated between Agassiz and Haig, on the north side of the Fraser River.

Although the greater part of British Columbia's people live in this area, a survey reveals that the majority of them have automobiles but cannot afford to venture on long trips; and it is with this in view that we show the benefits of construction of the road to those living on both sides of the river.

The completion of the highway would also have a great significance from a National Defence point of view. Over the entire length this route is on a southern exposure, thereby decreasing the winter snow-hazard.

Along this north shore route are innumerable streams and lakes, in whose cool, clear depths lurk the wary trout, which provide the great outdoor sport for both the skilled and unskilled fisherman. These trout are of many varieties and, like the northern people, virile and vigorous—so, take heed lest you are yanked into the turbulent waters.

Looking northward while travelling the "link," one catches glimpses of the hinterland, a veritable paradise both for the sportsman and botanist, which will be made accessible by completion of this highway, at present running only to Agassiz. Thousands of acres of alpine park will be within a few miles, where wild flowers grow in profusion and are symbolical of stratospheric spring and high altitudes that some day will be a mecca for tourists from all parts of the world.

Taking into consideration also the fact that we in British Columbia, and especially in the Fraser Valley regions, have to the south of us a friendly people of our own kin, totalling approximately 140,000,000, who visit our scenic Province in large numbers every year and would make this circular trip if it were accessible.

Starting at Vancouver one could travel on either side of the river to take in this wonderful 200-mile scenic loop. Following along the north shore one could meander from the main highway, taking in countless points of interest along the route.

This highway leads through numerous valley towns until finally bringing you to Harrison River, where one sees the blue-green glacial waters that flow down from upper reaches of Harrison Lake, about 7 miles away. At this point the Chehalis Valley is visible, calling to mind the Indian legends of the Susquach, a hairy race of giants, the survival of some prehistoric tribe.

Continuing from here, one crosses the Harrison River Bridge and starts a gradual climb over Agassiz Mountain, along which are situated several vantage points where one commands an unrivalled view over the Fraser Valley for miles. One looks down on a picture—a blend of farm lands, forests, and the Fraser River, each contributing its quota of beauty. On reaching the eastern slope of the mountain a trip to Harrison Hot Springs on the banks of the lake can be taken. Chapters could be written of the possibilities this area offers for fishermen—particularly in early spring, when the trout rise eagerly to the fly during the months of March and April. No other lake known to the writer in Canada offers such splendid sport to the fisherman during these months. At the head of Harrison Lake lies the primeval wilderness.

The unfinished portion of the highway runs from Agassiz to Haig, a distance of 20 miles. Commencing at Agassiz, this location runs through Seabird Island to Seabird bluffs, approximately 8 miles of what should be comparatively easy construction; from here we climb on an easy gradient of 6 per cent. to an

elevation of 150 feet above the river, 2 miles of heavier construction, the alignment on this fitting for any arterial highway. The panoramic scene from these vantage points embraces the whole Fraser Delta with its majestic flanking mountains—a picture that will hold one spellbound. The location now follows through Ruby Creek flats and across Ruby Creek—here is a delightful spot for camping or picnicking, plenty of scope for fishing and rambling. We now start the 4 miles along the Katz Indian Reserve which, like Seabird Island, is an alluvial deposit in which there are several thousand acres of rich, fertile land. This would also appear to be light construction. It might be of interest to note how this name, Katz, was derived. The story goes that in the early days of steamboat transportation the ship's cat left the boat at this Reserve landing, and on the return voyage was there to greet the crew—accompanied by quite a large feline passenger-list. From here we will soon be entering the majestic portals of the Fraser Valley canyons, where the picture is more definitely mountainous. From this point we see the mountain of old Indian legend fame, on top of which is the Petrified Dog who, at the time of the great flood, led the people to safety.

Continuing our course, we have a further 2 miles of much heavier work to complete. This entails much effort in engineering and design, so as to cut the costs to a minimum.

We pause at this point to reflect and wonder if the travelling public realizes the gigantic road problems confronting the Government of this Province. Much has been done and there remains still the greater portion to do before we can reap the harvest of our natural resources. It is not a far cry from the pioneer pack-trail days to this of modern transportation, and so it is not difficult to visualize what the future holds in store if we retain that pioneer spirit and push forward.

Continuing our journey, we follow along the meandering Fraser, with the Canadian Pacific Railway above us, backed by stately mountains. Shortly we pass underneath the Kettle Valley Railway at Petain, another scene beyond description—"just wait and see." At the same point we pass under the main line of the Canadian Pacific Railway and follow along until we come to Devil's Lake—a little gem nestling in the hills. Around this lake one feels the early history of the Province: here it was that one of the first surveys was made on January 28th, 1860, by G. Turner; no doubt

(Continued on page 15.)

Dominion-Provincial Works Programme, 1939-40

IN agreement with the Dominion Government a joint highway programme has been decided upon for reconstruction and improvement of roads to National Parks and development of tourist highways. The principal works in connection with roads to National Parks is Project No. 16, embracing the road from Kingsgate at the International Boundary to the Kootenay National Park, and this year 19 miles of reconstruction is being carried out along the easterly side of Windermere Lake. The reconstruction-work that was undertaken last year will be hard-surfaced.

In connection with the programme of development of tourist highways the principal work that will be carried out on the different highways is as follows:

Project No. 1—Trans-Canada Highway.—Island Highway section, a revision of Cobble Hill between Mile 28.3 and Mile 33 from Victoria. Revision for 1.6 miles between Hunter Creek and Jones Creek. Reconstruction between Cache Creek and Kamloops, 2.4 miles. Reconstruction between Mile 4 and Mile 5, west of Kamloops. Other work is also proceeding at Basque and Ashcroft Manor.

Project No. 2—Peace Arch Highway.—This is one of the major projects for this year's work and consists of reconstruction between Whalley's Corner and Whitehouse Corner. Gravelling from the Trans-Canada Highway for 13.3 miles to $\frac{1}{4}$ mile south of Campbell River Road. Extension of the 1938 contract south of Nicomekl River. The completion of the 1938 contracts and the construction of three bridges.

Project No. 3—Southern Trans-Provincial Highway.—Reconstruction and surfacing of 0.2 mile, Main Street, Princeton. Reconstruction at Mile 17. Improvements of various points between Cascade and Rossland. Revision 0.8 mile approximately 1 mile east of Michel. Also bituminous surfacing between Oliver and Osoyoos and between Mile 94.6 and Mile 95.8.

Project No. 4—Northern Trans-Provincial Highway.—Construction between Mile 3.31 and Mile 6.62 east of Usk.

Project No. 5—Prince George-Okanagan Highway.—Reconstruction and bituminous surfacing of 5.6 miles of highway between Penticton and Sum-

merland. Reconstruction between Mile 80.2 and Mile 82, Peachland; Mile 71 to Mile 72, Westbank; and Mile 58.3 to Mile 61.3, Kelowna.

Project No. 6—Huntingdon-Mission Highway.—Reconstruction between Clayburn and Matsqui, 1.7 miles.

Project No. 7—Nelson-Nelway Road.—Reconstruction between Hall Creek and Porto Rico, 5.3 miles.

Project No. 8—Rossland-Patterson Road.—Reconstruction between Mile 1.86 and Mile 2.76 and also construction of a bridge over Little Sheep Creek.

Project No. 9—Lougheed Highway.—Construction of the central arterial highway from Boundary Road to Underhill Avenue, 4.58 miles.

Project No. 10—Golden-Yoho Park Highway.—Work to be carried out under consideration.

Project No. 11—North Thompson Highway.—Reconstruction and improvements of various sections between Kamloops and Blue River, a total length of 10.4 miles.

Project No. 12—Spences Bridge-Merritt-Princeton Highway.—Revisions are being carried out on Rattle-

snake Bluff, Mile 3.2, and at Mile 14 from Spences Bridge.

Project No. 13—Trail-Pend D'Orville-Salmo Road.—Reconstruction from Mile 0.4 to Mile 4.81 south of Fruitvale.

In carrying out the work this year the same policy is being followed as in the past few years—namely, to confine the principal work to main trunk roads. The primary object of roads being to afford a means of transportation as economically as possible, compatible with safety and efficiency, and in this respect the first principle to be observed is the laying out of a trunk road. It is the intention to bring the main trunk highways of the Province up to standard construction as soon as is practicable, and in this respect each year a certain amount of work is done, reconstructing and realigning these roads in order that they may be in a suitable condition to take suitable hard-surface treatment, and each year sees the Department a step nearer its goal of having the main highways through the Province completely hard-surfaced and suitable for all types and speeds of automobile transportation.

NEW LAUNCH FOR WEST COAST SERVICE



"M.V. Milwin."

ON Thursday, July 27th, Mrs. F. M. MacPherson performed the christening ceremony at the launching of the "Milwin." The "Milwin" was

constructed by Armstrong Bros. and launched from their yard.

The new launch replaces the "L & H," which proved too lightly con-
(Continued on page 19.)

Recording of Utilities and Structures on Highway Rights-of-way

By F. L. MACPHERSON, Office Engineer, Court-house, New Westminster

OF vital importance in the administration of any Public Works Department is the filing and recording of the various utilities, privately and publicly owned, which utilize our highways to give some sort of service to the public.

As the recording of such utilities is a subject which is rarely referred to in technical magazines or discussed at engineering conventions, some particulars of the practice adopted in the District Engineer's Office, Court-house, New Westminster, may be both interesting and instructive to Engineers in other districts.

The compiling of the information, the completed application forms, descriptive plans, formal permits, and all correspondence relating thereto is undertaken in the ordinary manner common to most offices.

The problem is to assemble the essential facts in order that they may be conveniently available in a more composite and concrete form. Engineering District No. 3 has accomplished this by the compiling of "Utility plans."

Utility plans, while showing the more important location and survey features, are primarily concerned with the showing of the road as actually constructed, with the location of all bridge and drainage structures; their type, size, and date of installation; the location of all public utilities and authority for construction of same; the location and description of all private works constructed within the right-of-way, with their accompanying authorization; the location and description of highway signs and, where same are established under the "Motor-vehicle Act," the file reference is indicated.

In the average city where streets are part of regularly subdivided areas, the graphical recording of such utilities is a comparatively simple matter. In rural districts and unsubdivided areas traversed by our Provincial highways, the convenient plotting of the particulars is naturally more difficult, especially where the highway alignment is irregular. At any rate, if the plan is to be of any value it must be accurate in every detail.

A detailed description of our system can best be illustrated as follows:—

The plotted plans scale 1"=100', and are first traced on linen from which a blue-print is made for the use of the fieldman, who checks up all existing structures, pole-lines, and other utilities. Such data are then plotted on a tracing with the road limits distinctly defined in bold lines with Indian ink, all utilities being shown in clear vermilion. Linen tracing 21 inches wide has been adopted as our standard. From this blue-linen prints of a faint blue are made in regular lengths of 38 inches, 2 inches of which are allowed for the binding-strip. A couple of inches of the details of each preceding sheet are shown on the succeeding sheet. The sheets are paged and indexed at the right by road reference numbers and mileage. The loose-leaf binder in use is of stiff canvas, 39 by 33 inches, and can hold any number of sheets. This binder is kept flat on a counter, always accessible for consultation. The use of white-prints would probably be preferable, but they have not been adopted by our office due to the additional cost.

The nature and size of the sheets and the form of the binder are, of course, matters for individual choice, but the purpose of the plans is plain. It will readily be acknowledged that the compilation of so much useful information in such a compact and practical form effects considerable saving in time and trouble in searching files and consulting numerous other plans from which the Utility plan was compiled.

Particulars as to applications for construction of works within Crown lands and permits covering same are represented on the plan in the following manner:—

B.C.E.R. Poles, Drawing
K-8800-1899.
Appln. 18/12/35 Dist. File
11-0-9.
Permit No. 8-36, 13/2/36
Dept. File 1937.

In the case of pole-lines existing and proposed poles, these are separately defined. On the copy of the formal permit filed with the correspondence, the reference number is quoted. Any permits issued subsequent to the printing of the sheets are recorded both on the linen tracing and on the sheet in the binder. New

construction-works by the Department with dimensions and dates are also shown on the original tracing and on the printed sheets (in vermilion).

The recording of culverts and drainage structures, their dimensions, length, and existing location is of primary importance. However, it is felt that it is of equal importance that the type and date of installation also be recorded for future reference. This information will, in time, if properly kept up, indicate the type of culvert that is giving the best satisfaction under various conditions. Eventually it is the intention to assign reference numbers to all culverts which will appear on the Utility plan. When this has been done it will only be necessary for any field official when writing to the District Office to refer to a certain culvert number and all data can immediately be obtained from the plan. Important data to record are those of covered drains, the position of which may be required in the future in removing of obstructions or in repair or reconstruction works.

The location of all bridges and underpasses with their reference numbers is indicated. Full details of such structures, with road mileages, are given in our Bridge Registers, so it does not appear advisable to show on the Utility plan any non-essential data.

Mileage-posts, municipal and electoral district boundaries measured from some common centre (in the case of the Trans-Canada Highway from the Vancouver Post-office) are shown. The value of such distinguishing marks, particularly to outside officials, can readily be appreciated when reporting on any incidents or accidents, or when recommending anything on stretches of highways with no other definitely defined points.

Generally speaking, it is not considered advisable to show on such plans any more than really essential particulars. In the course of years much miscellaneous data are likely to accumulate and crowding of too much unnecessary data is therefore not recommended.

To fully appreciate the nature and extent of these Utility plans it is necessary to see the sheets in the binder. Only then can the importance alike to office and outdoor staff be properly appraised. Further details of the system with portion of the plans will be gladly furnished any interested District or Assistant District Engineer. Admittedly, the draughting of such plans involves considerable preliminary preparation and

(Continued on page 9.)

Improved Ferry Service Between Kelowna and Westbank

By J. ARMSTRONG, Mechanical Superintendent

REALIZING that the ferry built in 1927 for the Kelowna-Westbank service was no longer able to cope with the increased traffic demands, the Department decided on the construction of a modern vessel of adequate dimensions for present-day traffic.

Works, Ltd., Vancouver. The hull was fabricated in Vancouver and subsequently shipped to Kelowna for erection. The vessel was named "Pendozi," for the first missionary in the Okanagan District, the christening ceremony being performed by Mrs. F. M. Mac-

tice. It is double-ended, which eliminates the necessity for making a turn after landing, and consequently saves considerable time in making the run across the lake. The following dimensions may be of interest:

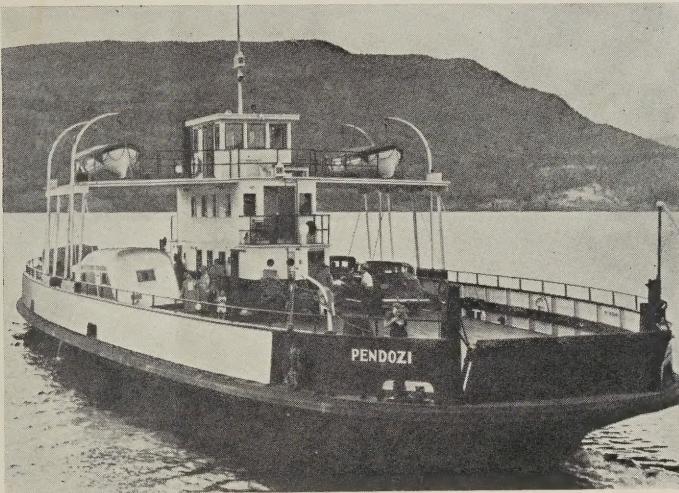
Length over all	140 ft.
Breadth	43 ft.
Draught, loaded	6 ft. 2 in.
Registered	
tonnage	191.13

The vessel is powered with two 160-horse-power Vivian Diesel engines and has a speed of 10 knots per hour; it is equipped with approved life-saving apparatus and every modern device for the safety and comfort of the travelling public. It has accommodation for 150 passengers and 30 average-size cars. The "Pendozi" will inaugurate a marked development in the handling of local passenger and tourist traffic and the freighting of orchard and farm produce in the Okanagan District.

The dimensions of the old ferry are as follows, and are interesting in comparison with the new ferry as an illustration of the development of passenger, tourist, and freight requirements in the Okanagan Valley:

Length over all	95 ft.
Breadth	33 ft.
Draught	6 ft.
Registered tonnage	70.89

It is powered with a 120-horse-power Fairbanks-Morse Diesel engine and has a speed of 8 knots per hour and accommodation for 87 passengers and 14 average-sized cars.



"M.S. Pendozi."

Contracts were let in August, 1938, for the construction of a steel hull and machinery to replace the Kelowna-Westbank Ferry. Contract for the hull was awarded to the Hamilton Bridge, Western, Ltd., Vancouver, and for the engines to the Vivian Engine

Pherson at the launching on May 18th at Kelowna, in the presence of a very large and interested audience.

The new ferry is of steel construction throughout and has been designed and constructed in accordance with the best modern ship-building prac-

THE PEACE ARCH HIGHWAY

(Continued from page 3.)

The bridge structures, three in number, creosoted substructure with concrete roadway and sidewalk for pedestrians, have a roadway width of 24 feet and are so designed and constructed that they can be widened for four-lane pavement with a minimum of expense and without interruption to traffic.

There are three of these bridges and they are the first of their type to be constructed in the Province. A

brief description of the construction appears elsewhere in this issue.

The present year's work consists principally of completing the road-bed started by camp labour between the Campbell River Road and the Nicomekl River and the graveling of the entire section from the Trans-Canada Highway to Campbell River Road, 60,000 cubic yards of crushed, screened gravel being required for this purpose.

The pavement surface is being postponed until next year to allow for settlement taking place.

The grading quantities amount to about 450,000 cubic yards of classified materials. Over 6,000 lineal feet of permanent culvert have been installed.

The present plans call for an asphaltic pavement 22 feet in width, with oiled shoulders 8 feet wide on either side.

Ornamental trees are also being planted, about eight hundred of which are now in place.

The road, when completed, will be modern in every respect and with its long easy curves and low gradients will, we think, relieve the traffic problem on this highway for some years at least.

DESIGN FOR AN EXPRESS HIGHWAY

IN this design the writer had in mind urban and suburban areas, rather than those with a more scattered population.

Such a highway should be planned to provide adequate accommodation for traffic presently in sight without extravagant immediate provision for the future, and yet be capable of taking care of future needs without requiring any basic reconstruction during the course of such expansion. Two essentials are apparent:—

First: A right-of-way of adequate width. Commercial and residential de-

velopment always follow a newly constructed highway, and the cost of securing additional width of right-of-way later is always much higher than would be the case were an adequate width obtained in the first instance.

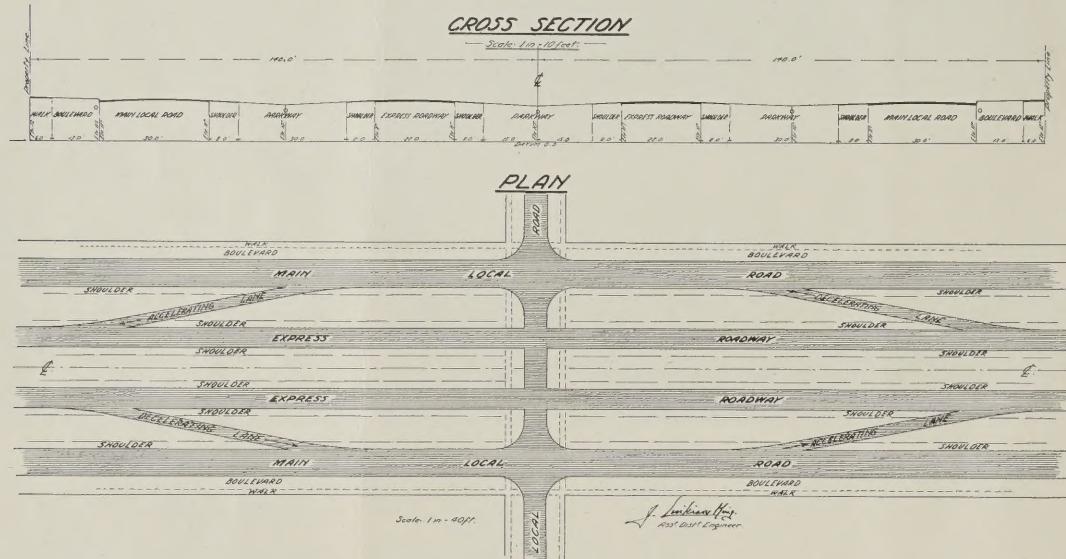
It will be noted that intersecting local roads cross the main highway at grade; this is the first stage; grade separation is a costly undertaking and will be justified only when extreme density of traffic is reached. I would point out, however, that a local road should not be carried across the highway unless the location is favourable for such a level crossing. Level crossings should be placed at suitable sites, and local traffic diverted along the main local road to that point.

tersecting roads will enter the main local road and proceed to an accelerating lane, over which it will enter the main highway.

The main local roads will, in addition to the duties outlined above, serve the needs of commercial and residential interests adjoining the highway.

Now for the future: When the density of the traffic on the main highway becomes such that intersecting traffic has difficulty in crossing, grade separation becomes a necessity.

Grade-separation structures will be put in at points where their construc-



Second: Proper location. The alignment, both horizontal and vertical, should be the best procurable; then the highway can be expanded to meet increases in traffic without serious loss to the original investment. The roadway can be widened, the pavement thickened to bear increased loads, resurfaced to provide smoother riding, and more lanes can be added as may become necessary. The design shown on the accompanying plan and cross-section was laid down with the idea of stage development kept closely in mind.

The main local roads in the first instance would probably not require to

such suitable sites would occur at the junction of a cut and fill or at points where the grade-line practically coincides with the ground-line.

All intersecting roads should not be given crossings. Level crossings at from $\frac{1}{2}$ to 1 mile intervals should be adequate, the main local road carrying traffic to them.

Note also the width of the dividing strips—i.e., 46 feet. As the maximum length of load allowed, including trailer, is 45 feet (see "Highway Act"), this condition allows cross-traffic to make the crossing of the two highway lanes in stages—a safety feature.

No turning off into intersecting roads will be allowed from the main highway lanes. Such traffic will come off on the decelerating lanes to the main local road, from which the turn will be made into the intersection. Traffic from in-

tion will prove most economical, as the main local road is always available to carry traffic thereto.

With the installation of grade-separation structures, the local traffic would function normally undisturbed by the express traffic.

With the grades separated at the crossings, the need of the extra wide separating strips disappears, and part of this can be used to add additional lanes to the roadways on either the main highway or the main local roads or both.

On the express roadways, grades not higher than 5 per cent. are preferable, but in extreme cases a short stretch of 8 per cent. would not retard traffic, provided that it was on a tangent or, say, anything under a 1-per-cent. curve.

(Continued on page 19.)

JONES CREEK BRIDGE

By G. M. DUNCAN, Designing Engineer

FOR main roads where traffic loads are heavy and wide roadways are necessary, timber King spans have proved uneconomical and unsatisfactory. For these reasons the Department has been adopting designs in concrete and steel of the continuous steel-beam type.

At Mile 86, Trans-Canada Highway, Hope-Rosedale Section, is a typical sample of these structures. The photograph illustrates the main details of their construction.

The alignment is on a $2^{\circ} 30'$ curve requiring a superelevation of $\frac{1}{4}$ inch per foot. Roadway width is 24 feet, designed for the heaviest loadings permitted under regulations, and consists of a 7-inch roadway slab supported on six steel beams of wide flange heavy sections.

The beams are continuous over four supports in spans of 29, 52, and 29 feet. Thus moments are reduced and expansions are eliminated except at the abutments. This also permits a considerable reduction in quantities of concrete in piers and abutments.

The concrete diaphragms serve the dual purpose of stiffening the beams transversely and supporting the curb and balustrade which cantilever over the outer beams.

Considerable thought was given to the architectural features. An attempt was made to satisfy the demands of art in the matters of simplicity,

close relation and proportions of all members in the structure, and the definiteness with which the members themselves and the structure as a whole are marked satisfy one's ideas of fitness and beauty.

The execution of the work both with respect to soundness and finish deserve special mention. It is indeed hard to find cause for any criticism in these

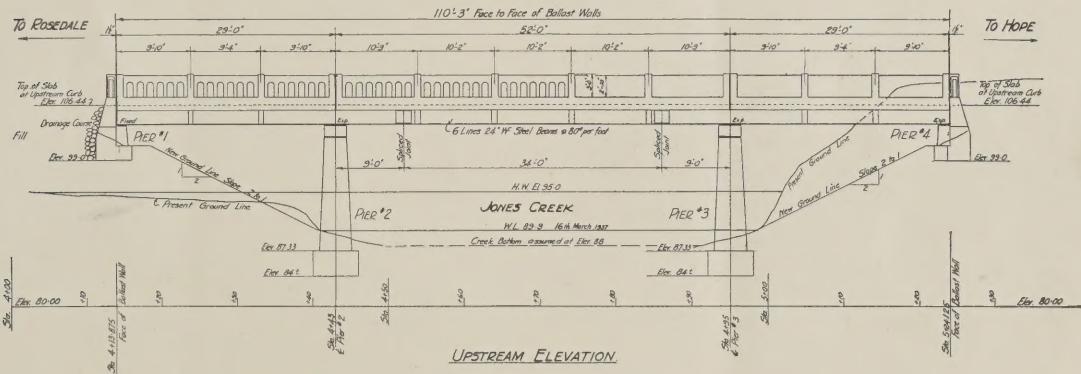


Fred Hardie Jones Creek Bridge. Foreman Fred Hardie

continuity, unity, and definition. The balanced three-span layout of simple members, simply supported, the structural continuity and unbroken lines marking beams, water-table, etc., the

respects. In such a beautiful setting it would have been unfortunate if this bridge proved to be unattractive.

The work was carried out by the Department's own forces.



Jones Creek Bridge.

Recording of Utilities and Structures on Highway Rights-of-way

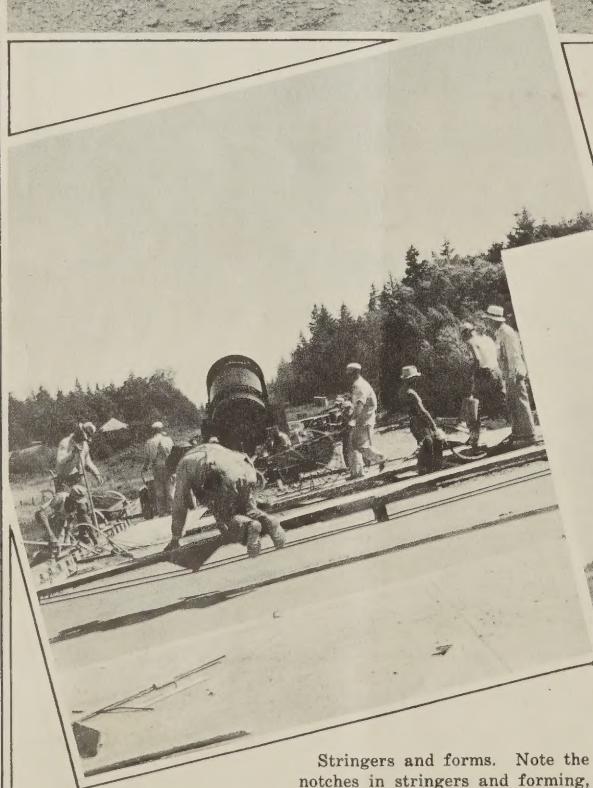
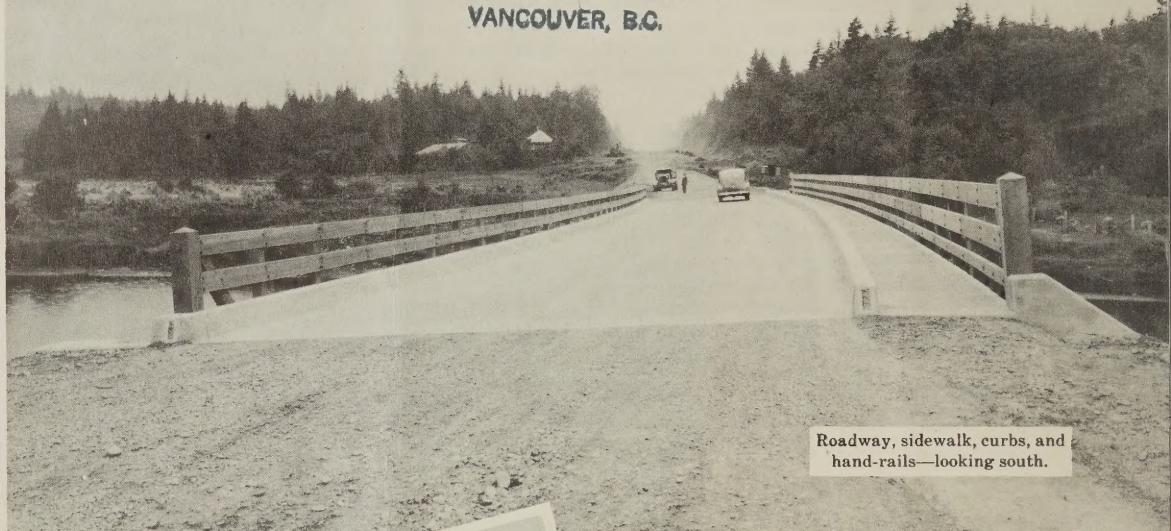
(Continued from page 6.)

planning and, obviously, some extra expense, but in many settled areas they appear essential. The earlier they are commenced, the sooner will the data be conveniently available at

a local district office. Plans already prepared at New Westminster (some are presently in course of preparation as circumstances permit) have amply proven their value to such an extent that they are considered indispensable

to the efficient and expeditious planning of proposed utilities, and they are frequently referred to by officials of municipalities, public utility companies, B.C. Land Surveyors, and private individuals.

FROM THE COLLECTION
OF T. D. KILPATRICK
VANCOUVER, B.C.



Stringers and forms. Note the notches in stringers and forming, consisting of 1 by 3 ribbons nailed to sides of stringers, 2 by 4 cross-joints, and boxes for concrete bridging.



Foreman T.D. Kilpatrick

Uplift spikes and curb forming.



Substructure and abutments.

Slab reinforcement, ready-mix truck and concrete placing, vibrating and tamping.



Ready-mix truck, placing, vibrating and finishing.

NICOMEKL, SERPENTINE, AND BEAR CREEK BRIDGES, PEACE ARCH HIGHWAY

By G. M. DUNCAN, Designing Engineer

CREOSOTED timber bridges with composite concrete and timber deck systems are now looked upon with considerable favour by engineers. The one at Haig on the Trans-Canada Highway is the type having a solid laminated timber slab overlaid by a

timber members exactly similar to an originary stringer system and on that, after the proper forms are constructed, is laid the concrete slab. Horizontal shear is resisted by notches in the top edges of stringers into which the concrete naturally moulds

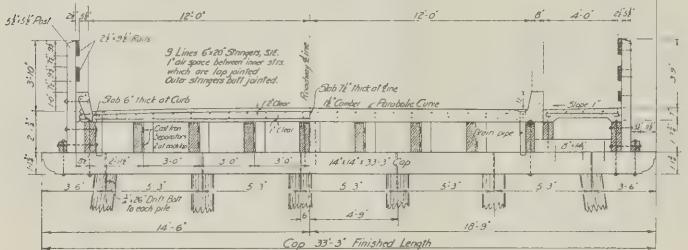
The substructure consists of creosoted pile bents spaced at 17-foot centres, six piles per bent. The roadway is 24 feet wide and a single sidewalk 4 feet wide, concrete curbs and timber handrails. The curvature is on a 4° curve superelevated to $\frac{3}{4}$ inch per foot. The design throughout provides for the heaviest loadings.

The prime reason for adopting this construction, aside from its semi-permanence, is that in the soft formation underlying this peat bog area in the Delta a pile foundation provides a safe substructure at remarkably low cost and with the least obstruction to the stream. As far as traffic is concerned, this bridge has all the advantages of the most expensive types.

The details of construction were very thoroughly executed and in record time. As shown, ready-mixed concrete was delivered from a plant 20 miles distant. Vibrators permitted placing at an exceptionally low slump. High early as well as final strength were attained. The form work is perhaps as efficient and economical as could be devised.

The appearance is satisfactory in the sense, at least, that the bridge fits the site and functions properly as a highway structure.

The construction was carried out by the Department's own forces.



CROSS SECTION

NICOMEKL BRIDGE
PEACE ARCH HIGHWAY

concrete slab, the horizontal shear being resisted by triangular steel shear developers, and the uplift by wire spikes. This is composite construction and was described in a previous "Journal."

The three bridges on the Peace Arch Highway differ in that the bottom part of the deck system consists of

itself. The uplift spikes are similar to those at Haig. Both types have their advantages and disadvantages and both result in structures that will give exceptionally long life.

The one just completed over Nicomekl River is illustrated by photographs and various interesting details are explained in notes attached thereto.

District Engineer Jones says the travelling public, even when inconvenienced, appreciate the Department's efforts on their behalf. Mr. Jones had a number of cards printed with the following wording:—

NOTICE.

We are doing this work for your benefit.
Please co-operate by travelling the nextmiles at 20 miles per hour. Thank you.

PUBLIC WORKS DEPT.
British Columbia.

These are handed to motorists at one end of a construction job and picked up at the other end. Both men handling cards wear red shirts and white helmets. The request has been followed by over 90 per cent. of the motorists, who seem willing to oblige if requested, but try to beat the game if "ordered." Reminds one something of prohibition.

In many instances when cards are picked up at the end of the section they are found to have favourable comments written on them. In any case, never any derogatory remarks. We think that if "Evan" hasn't got this idea copyrighted that other engineers might adopt it.

TRANS-CANADA HIGHWAY

Jones Creek to Hunter Creek Section (Mile 86.2 to Mile 91.1)

By ERNEST SMITH, Assistant District Engineer, Court-house, New Westminster

Fred Hardie

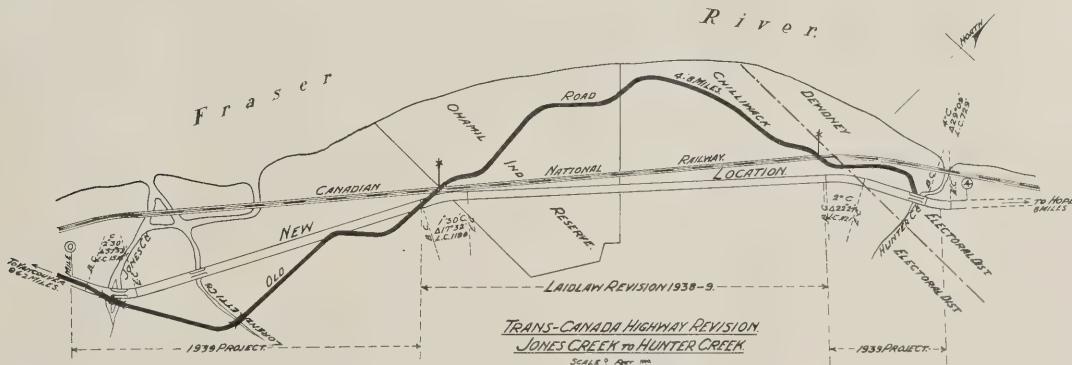
FOR many years the old Hope-Rosedale Road, now a part of the Trans-Canada Highway, was deservedly known as the worst road in the country. It was the old story of conversion from a pack-trail to a wagon-road; thence to a road over which it was just possible to drive a motor-vehicle. Numberless steep pitches and abrupt turns, with a narrow road-bed, blinding dust in summer, in the winter snow and ice, and in the early spring the appearance of a deeply-ploughed field for miles, caused by frost leaving the ground, often resulting in the discontinuance of traffic for considerable periods.

ing the Laidlaw District where the mountains on the southerly side of the Fraser Valley recede from the Fraser River, leaving an area of reasonably flat country which has been sparsely settled and partly farmed for the past fifty years or so.

In September, 1938, a contract was let under the Railway Grade Crossing Elimination Fund for the construction of what was known as the Laidlaw Revision in order to eliminate the two level crossings over the Canadian National Railway main line at Laidlaw. The contract was completed in the early spring and about 2 miles of standardized highway were procured;

Creek to Laidlaw and from the easterly end of the Laidlaw Revision section to Hunter Creek. This work is now in progress and should be completed in October.

A permanent bridge where the road will cross Lorenzetti Creek has been completed by Department forces. This bridge is of creosoted timber substructure with reinforced concrete deck, curb and handrail, and is 119 feet in length. This bridge is one of four of this type to be constructed in Engineering District No. 3 and is also the first of this type to be built in British Columbia, and it will be described elsewhere.



A few years ago a complete survey was made and approved and a definite policy was formed in this Engineering District with regard to this section of the highway, and that policy of continuous and progressive reconstruction has been rigidly adhered to as far as funds have permitted.

The work was carried on by the personnel of relief camps, by contract, and by day-labour, year after year, on a carefully located line, with the result that from Rosedale (Mile 75) to Jones Creek (Mile 86) there is a standardized road which has even brought many favourable comments from the travelling public.

An asphaltic-mulch surface was applied to this 11-mile section in 1937 and 1938.

The current work, commencing at Jones Creek, is following the plan and policy referred to above. This section of the Trans-Canada Highway lies between Chilliwack and Hope, travers-

this section has not yet been opened for traffic, however, as the easterly, or Hunter Creek, end was not connected with the existing road.

Quite obviously this year the programme was to construct the new road from Jones Creek to connect with the westerly end of the Laidlaw Revision section, and from the easterly end of the same section to connection with the existing old road at Hunter Creek.

With this in view it was first necessary to construct a new bridge at Jones Creek to replace two obsolete wooden bridges of the old King-truss type with one permanent structure. The new bridge of concrete and steel construction, a continuous beam type and the first to be built in this Province, was successfully completed in July of this year and will be described elsewhere.

Also in July a contract was awarded under the Federal Aid Agreement for the construction of the road from Jones

Principal quantities in the contract schedule are as follows:-

Clearing.....	22.5 acres.
Grubbing.....	22.5 acres.
Grading ($\frac{1}{2}$ mile free haul).....	36,454 cu. yd.
Overhaul.....	74,000 cu. yd. miles.
Gravel.....	6,200 cu. yd.
Special slope treatment....	4,500 lin. ft.

The material to be dealt with is of excellent quality for subgrade purposes. At Jones Creek, the commencement of the contract, the material is practically all loose rock, nearing Laidlaw it is light silty soil, while at Hunter Creek nothing but gravel and loose rock will be found. It is, therefore, obvious that an ideal subgrade will be obtained. First-class surfacing gravel is available on the Hunter Creek section where the contractor

(Continued on page 19.)

Regulation of Motor Carriers in British Columbia

THE operation of motor carriers undertaking the transportation of passengers and freight for compensation on the highways of the Province is regulated by Part V. of the "Highway Act" which applies only to primary or arterial highways in municipalities and to all highways in unorganized territory, which highways are all under the jurisdiction of the Provincial Government.

The roads, bridges, and ferries of this Province are built to certain standards. Some fifteen years ago it became apparent that, with the rapid improvement in construction of motor-vehicles and engines and the corresponding increase in their size and carrying capacity, it was necessary to establish certain limits and therefore legislation was passed for the regulation of the gross weight, length, width, and height of motor-vehicles so that the loads should not exceed the loads which could be borne without damage to the structures.

In framing the British Columbia Act similar legislation elsewhere was studied. It was desired to frame a code that would meet our special conditions without creating undue hardship for those persons who were already established in the industry.

The present Act broadly divides the various motor carriers in the Province into two classes, namely, public carriers and limited carriers. These two classes are subdivided into passenger carriers and freight carriers.

A public passenger-carrier operates for the transportation of the public over a fixed route on fixed time schedules between fixed termini.

A public freight-carrier operates for the transportation of freight for the public over a fixed route on fixed time schedule and between fixed termini.

These two classes pay fees according to the number of passengers carried or the amount of freight carried and, included in the passenger class, are all the regular bus lines.

The other main class, the limited carriers, operate with certain restrictions. Limited passenger-vehicles are generally restricted as to territory, but the chief restriction is that the vehicles must be hired as a whole. In other words, individual fares may not be collected as this would entail unfair competition with public passenger-vehicles which must run on schedule, whether traffic is available or not, whereas the limited passenger-vehicle

may operate at any time and is not restricted to a time schedule, fixed route, or fixed termini.

Limited passenger-vehicles are subdivided into three classes, according to the number of passengers carried, and the fees vary for the different classes.

Limited freight-vehicles are restricted as to route and territory served or commodities carried and are not required to operate on fixed time schedule or between fixed termini.

Limited freight-vehicles are subdivided into three classes, depending on the amount of freight authorized to be transported.

The above classes of motor-vehicles include all vehicles operating for compensation on the highways of the Province.

There is, however, a large number of motor-vehicles not operated for the public for compensation but used privately for delivery of goods or merchandise, such goods or merchandise belonging to the owner of the vehicle. Such vehicles are known as private freight-vehicles and are only regulated by this Department as to gross weight and dimensions.

This class includes vehicles owned by merchants for the delivery of their own goods and by farmers for use in their farming operations and comprise the largest number of motor freight-vehicles in the Province. There is no fee payable for a farmer's licence.

Motor-vehicle transportation has shown a steady annual increase in licensed vehicles since the Act was passed and below is given a table showing the licences issued in the years 1927 to 1938, inclusive.

quently arise where it is necessary for a carrier to undertake an operation which has not been anticipated and, therefore, which is not included in his Conditions of Licence. Consequently, in order to facilitate the movement of freight and passengers, it was found necessary that the Minister of Public Works, or his duly authorized representatives, should have the power to issue permits to cover such operations. There is provision to issue permits to cover the operation of an unlicensed vehicle for one special trip on payment of a fee; the operation of a licensed vehicle in a manner other than in accordance with the Conditions of Licence respecting that vehicle; the operation of a substitute vehicle when the licensed vehicle is undergoing repairs or overhaul; the operation of an additional public passenger-vehicle to handle overloads; the carrying of passengers on a licensed freight-vehicle under certain conditions. Provision is also made to issue permits allowing of a farmer to transport produce for his neighbour for compensation under certain clearly defined limitations, and to transport pickers and packers during periods of crop movements, and there is provision for granting of permits for operation of a school bus to convey school pupils to or from a duly sanctioned function.

The three last-named permits are issued by the Provincial Police; the other permits are issued by duly authorized officials of the Department of Public Works.

Every application for a public-vehicle licence must be accompanied by a time schedule showing the times of departure from and arrival at each terminus and departure from intermediate points.

CARRIERS' LICENCES ISSUED.

Year.	Public Passenger.	Public Freight.	Limited Passenger.	Limited Freight.	Private Freight.	Total.	Remarks.
1927	177	—	—	—	—	177	
1928	185	—	—	—	—	185	
1929	208	—	—	—	—	208	
1930	277	172	—	—	—	449	1930 Act.
1931	248	226	—	—	—	474	
1932	218	209	—	—	—	427	
1933	228	202	—	—	—	430	
1934	237	207	—	—	—	444	
1935	162	129	52	173	1,156	1,672	1935 Act.
1936	219	184	338	1,028	6,063	7,832	
1937	264	230	465	1,841	8,348	11,148	
1938	268	223	476	2,052	8,951	11,970	

NOTE.—These figures include licences cancelled during the year.

The operations of motor carriers are so diverse that, notwithstanding careful regulation, circumstances will fre-

quently arise where it is necessary for a carrier to undertake an operation which has not been anticipated and, therefore, which is not included in his Conditions of Licence. Consequently, in order to facilitate the movement of freight and passengers, it was found necessary that the Minister of Public Works, or his duly authorized representatives, should have the power to issue permits to cover such operations. There is provision to issue permits to cover the operation of an unlicensed vehicle for one special trip on payment of a fee; the operation of a licensed vehicle in a manner other than in accordance with the Conditions of Licence respecting that vehicle; the operation of a substitute vehicle when the licensed vehicle is undergoing repairs or overhaul; the operation of an additional public passenger-vehicle to handle overloads; the carrying of passengers on a licensed freight-vehicle under certain conditions. Provision is also made to issue permits allowing of a farmer to transport produce for his neighbour for compensation under certain clearly defined limitations, and to transport pickers and packers during periods of crop movements, and there is provision for granting of permits for operation of a school bus to convey school pupils to or from a duly sanctioned function.

With regard to rates or tolls—at present the Act requires that each applicant for a public or limited licence, whether passenger or freight, must file his schedule of tolls or charges, and it is contrary to the regulations for any licensee to collect or demand a greater, less, or different rate than the rates "filed and approved and in effect." Approval is required before any rate or toll may be changed.

The schedules of tolls for carrying passengers do not present much difficulty, but the question of rates for transportation of freight is an extremely complex one. It is obvious there is a need for a more simple method of classifying freight transported by truck and it will be necessary to draw up a simplified freight tariff for the Province to suit all classes of operations.

The regulation of hours of work for drivers of trucks is provided for under the "Hours of Work Act."

A difficult problem is the control of transportation of passengers on freight vehicles. At the present time permits

are granted in certain cases for carrying passengers on trucks subject to inspection of the vehicles and certain other requirements as to safety, such as provision of seats, sideboards, endboards, etc. This, however, is only a temporary solution of the difficulty.

In conclusion, it is obvious that highway transportation has by no means yet reached the ultimate of its development; the number of units on the road is increasing yearly. With the building of new roads transportation is reaching out to districts which were hitherto inaccessible, with consequent rapid settlement and development of these districts. By means of the modern truck these outlying settlements are now provided with the comforts of modern civilization, such as fresh fruits and vegetables, meat, fish, and other perishables, and the city dweller is supplied with the products of the farm or ranch, often hauled considerable distances overnight and arriving in fresh condition to the user.

The licensing of motor-vehicles must be considered in the light of public

convenience and necessity for the service. There is still a very great public need for transportation services of railroads and steamships, and their operations require protection to the extent of allowing at least fair competition with motor-vehicle transportation.

There will probably be a co-ordination of the laws in all countries regarding motor transportation. At the present time each Province and State has its own laws and regulations governing motor transportation on the highways. These laws and regulations differ so materially in each Province and State that interprovincial, interstate, and international motor transportation is seriously hampered. It will probably never be possible to enact a law which can be applied universally, but it may be possible for Provinces and States to agree on general principles as to licensing of motor-vehicles, limitations of gross weights, dimensions, fees, and reciprocal arrangements between Provinces, States, and countries.

HOBBIES

THAT our genial Mechanical Superintendent, Mr. John Armstrong, is not merely mechanical by designation is evidenced by the miniature locomotive and cars which he recently completed.



Model train in action.

Mr. Armstrong served his time in the C.P.R. shops at Revelstoke, and since then the building of working models of engines of various types has been his hobby.

Three years ago he started on the present model which is perfect in every detail. The engine, tender, and

cars were built complete in Mr. Armstrong's basement-shop.

The train, operated, as the name on the sides of the cars says, as the James Bay and Victoria Railway, has created tremendous local interest. Mr. Armstrong has a track running out from his basement, around his back yard and "leased" vacant lot, and on holidays the train has been puffing

exhibited at the Canada Pacific Exhibition in Vancouver, where thousands of children had an opportunity to ride on this "toy" train, operated part of the time by the "manufacturer" himself.

AGASSIZ-HAIG

(Continued from page 4.)

one of those stout fellows who gave us our start in '59 looked on this as a home.

This now brings us to the last link, and it is at Haig we connect up with the Cariboo Highway and the modern Haig overhead concrete bridge over the Canadian Pacific Railway. Here we see Holy Cross Mountain, from which the name "Hope" was derived for the townsite; a short distance and we are over the steel span of the Fraser and entering the Village of Hope. The beauty of this spot needs no description—most of us have travelled down the south side with its modern highway and all those delightful cool spots in which to rest, through Chilliwack and those great agricultural areas which are so fertile.

Our journey ends as we cross the modern Pattullo Bridge over the Fraser River and enter the old, historic town of New Westminster. It was truly a great day's outing, and when once completed, does its own advertising.

It is to be admitted that other parts of the Province are very beautiful, but District No. 2 remains *nullius secundus*.

TRAFFIC-LINE MARKER

By H. GRIEVE, District Mechanic

A TRUCK type marker was built at the Department Mechanic's shop at Cloverdale in 1938, which has given great satisfaction in the 1938 and 1939 seasons.

Although the idea is not entirely new it has several unique features, and a line of high quality can be obtained, depending, of course, on the human element involved.

The machine consists of a four-wheeled carriage to carry the paint-guns, sights, etc., this carriage being pushed by a truck which carries the paint supply-tank, air-compressor, etc.

The painting-machine is made up with a steel frame 30 inches wide and 12 feet long, supported on four wheels (Ford V-8, 600-16), the wheel-base being 96 inches. A folding sight extends out in front 8 feet and is supported at its extreme end by a small rubber-tired wheel.

The front axle on the main frame is rigid and the front wheels set somewhat narrower than standard gauge.

The rear axle is made up of a Ford V-8 front axle and steering assembly, the axle itself being installed backwards or in other words so that the wheels turn in the opposite direction to the steering-wheel; this causes the back end of the machine to swing, actually steering the same direction as the steering-wheel is turned, and when looking over the sights in their extended position it is quite apparent how much to turn the steering-wheel to follow a given course.

The operator's seat is at the rear end and is fairly low, so that he may see for a long distance along the road, rather than directly at a short section immediately in front of him.

The spray-gun and painting assembly is mounted on the front axle and is operated by a pedal in front of the operator's seat. To commence painting the operator simply exerts a slight pressure on the pedal, this releases its lock; he then lets the pedal slide out free, this lowers the paint assembly and automatically opens the spray-gun. To stop it, the operator simply depresses pedal which automatically locks after lifting painting assembly and shutting off spray-gun. The operator can also regulate the air-pressure supply to the spray-guns, there being an air-regulating valve located conveniently within his reach.

The paint is supplied to the painting-machine from the truck by means

of a rubber hose; this is led up to the front of the machine through a paint-trap to the gun. Compressed air for the gun is supplied in the same manner, through rubber hose from the compressor in the truck to regulating-valve, from there on to water-trap

the top of the hill he then raises the one white painting assembly and lowers the opposite one; this changes the white line to the opposite side of the yellow line. These operations are all done without stopping the machine, the extra painting taking no extra time.

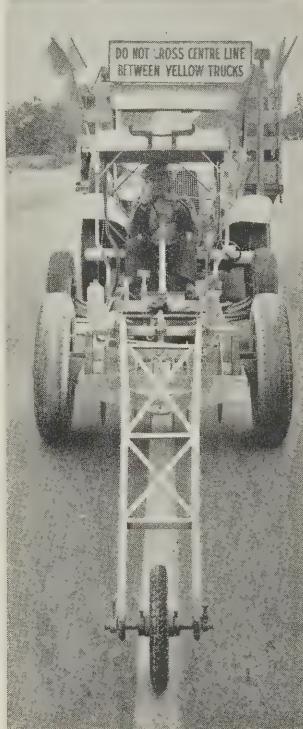
The painting assemblies are slung between the front wheels, which are rigidly attached to the frame (the rear wheels doing the steering), the reason for this being that it takes a great deal of movement on the steering wheels to influence the rigid wheels.

The painting assemblies are all independent of each other and consist of a Binks No. 7 paint-gun which is mounted on an adjustable arm so that it can be raised or lowered. On each side of the gun there is a 16-inch steel disk which rolls on the road and cuts the edge of the fan-shaped spray of the paint-gun, thereby making a clear-cut edge on the paint-line and keeping it to a predetermined width, which is obtained by adjustment of the disks. Each disk is free to follow the contour of the road surface, thus preventing the spray from blowing underneath the disks at times and causing an indistinct or feather edge on the line.

A small tank is conveniently located for each gun, so that when moving from one job to another the guns can be immersed in a thinner or solvent, which keeps the guns from drying up and becoming plugged.

A push-bar is mounted at the rear end of the main frame to couple the carriage to the truck that pushes it. This arrangement consists of a vertical shaft held rigid to the main frame through holes in a yoke, the shaft having a head on the upper end and a cotter pin in the lower end. A special bumper is installed on the truck, having a long horizontal slot 4 feet long and wide enough to permit free movement. The main frame has a towing-ring in the front end. This is used when the machine has to be moved some distance. When moving the sights are folded back and fastened, the steering-gear is locked with a pin which fits into a hole drilled through the steering-column bracket, case, and shaft. Paint and air hose are disconnected and the push-bar vertical shaft is withdrawn. This completely disconnects the painting-carriage from

(Continued on page 18.)



located close to the gun, the idea being to catch any condensation or dirt just before the air enters the gun.

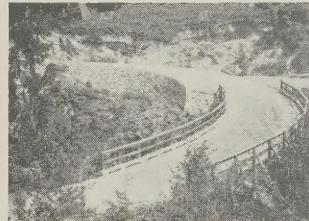
The machine is equipped to paint up to three lines at a time, four to six inches wide. This makes it possible to use two colours of paint for a double line on curves, or over the crests of hills, as the painting assemblies are placed side by side. For example, when coming to a hill painting a yellow line, using the centre painting assembly for yellow and having the two outside guns charged with white, upon reaching the indicated place for the beginning of the white line, the operator lowers the white painting assembly indicated without stopping the machine, upon reaching

Scenic Highways along the Coast-line

By J. FORSYTH

IN January, 1935, after an exceedingly wet period, all traffic on the lower mainland was disrupted by a heavy snow-storm which was immediately followed by warm rains and abnormal run-off. This run-off was particularly disastrous in the Spanish Banks section of Point Grey, where the land is almost entirely a fine, sandy, silt formation. At that time there was a small, inoffensive stream that followed a slight depression through the University of British Columbia area and finally found its way to the sea down through the Lefevre Ravine; but, when this abnormal runoff took place, this stream became a raging torrent and, due to the already soaked condition of the soil, the added flow of the stream quickly converted what appeared to be a well-timbered, stable ravine into a moving mass of quicksand, into which collapsed sections of Marine Drive and the East

a log crib entirely for its stability to withstand the heavy seas in the winter months, and as this was not always effective slides and washouts were a common occurrence on this important scenic highway for Vancouver. After completion of the fill, fur-

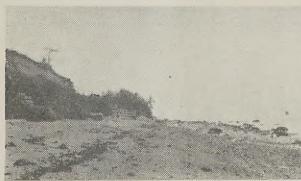


Sechelt-Pender Harbour Road.

ders. This, coupled with a 20-foot pavement on good alignment, and with ample parking facilities, has made this 1-mile section of water-front one of the most popular beaches around Vancouver.

On the North Shore of English Bay, in the Municipality of West Vancouver, is Primary Highway 67A, Marine Drive. It is 11.13 miles long, and the glorious view obtained for its entire length of the ever-changing waters of the Gulf of Georgia or the majestic mountains along the coast-line has made this drive one of the most popular on the lower mainland, as is evidenced by the continual stream of traffic during the summer months.

Another highway located in exceptionally beautiful surroundings is the road from Hopkins Landing on Howe Sound to Pender Harbour at the mouth of Jervis Inlet, a distance of 51 miles. Unfortunately, there is no connection

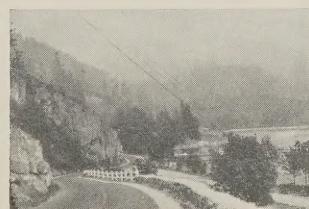


Spanish Banks before improvement.

Mall, together with the bridges which crossed the ravine at this point, and before any effective method could be installed to divert the stream safely a washout 200 feet wide by 75 feet deep, with almost perpendicular walls, had been formed at the Marine Drive crossing.

As it was practically impossible to relocate the road or reconstruct the bridges, it was decided to fill in the washout with 370,000 cubic yards of borrowed material, as an elaborate scheme to control the drainage from the U.B.C. was under consideration and no further trouble in this section was anticipated. In order to obtain economically the necessary borrowed material for the fill within a 2-mile haul, it was decided to kill two birds with one stone and carry out a much-needed improvement to Marine Drive at Spanish Banks by widening along the bluffs and improving the alignment. A glance at the cross-section of the old road shows it depended on

ther widening along the bluffs was undertaken, in conjunction with a more adequate form of highway protection. A series of rock groynes were constructed, as per sketch, for a distance of 4,900 lineal feet. The top surface of these groynes between low-water mark and high-water mark was finished to a 10-per-cent. grade, which observation has shown to be approximately the natural slope of a sandy beach formed by the action of the tides. The cut material from the bluffs—175,000 cubic yards, which was 75 per cent. sand—was used as fill from the toe of the groyne at low-water mark to the top of the original crib, which was well above high water,



Spanish Banks after improvement.

as shown on typical section of completed work. This has proved very effective as highway protection, as the force of the waves is spent on the grade before the level of the highway is reached, and an added attraction has been supplied to this beauty spot by the creation of 15 acres of fine, sandy beach, which had previously been an unsightly mass of rock boul-

other than by steamer with the highway system of the Province and this section—otherwise it would be a mecca for motorists and holiday-seekers, as along this section of the coast-line it is possible for the most fastidious to indulge in his favourite fancy, whether it be just rolling along enjoying an uninterrupted view of the Gulf dotted with the hardy little putt-putt fishing-boats, or lazing in a nice, secluded cove. If the tang of the sea does not appeal there is a wide selection of creeks and small lakes, where the disciples of Isaac Walton can tempt the shimmering rainbow; or, if you are one of those who enjoys a holiday better by watching the other fellow at strenuous work, there is the husky logger to be seen bringing down the giant firs at the many logging camps along the way, or the agile boom-man hopping amongst the logs at the booming-grounds in the bay.

British Columbia Builds Its First Four-lane Highway

By H. C. ANDERSON, District Engineer, New Westminster

DURING the construction of the Pattullo Bridge it was foreseen that it would be necessary to provide more adequate facilities of road approach if the bridge was to serve its main purpose—the relieving of traffic congestion at this point.

In the bridge construction, provision was made for eight toll-lanes at the Toll Plaza and therefore it was necessary to have the additional approach roads to allow the traffic to distribute itself before reaching the bridge.

using M.C. 3 asphalt and finally seal-coated. It is interesting to note that although this surface has become uneven due to settlement over the peat bog, no failure has resulted in any way and this section of the highway is subjected to extremely heavy loading.

It was soon evident that the start on the four-lane highway would have to be extended and this was carried on as far as Whalley's Corner at the top of Peterson Hill during 1938, which permitted the slow-moving freight

Scheme were called during the month of July for the last extension, 1.2 miles in length. A temporary surface only is being put down on this section this year, the permanent paving being left over until next year to permit any settlement to take place. This latter section has four 11-foot traffic lanes with a 6-foot "dead" strip between opposing traffic lanes.



Looking south on Peterson Hill.

Accordingly, a little more than a mile of four-lane pavement was constructed, utilizing the old pavement in part by resurfacing same. This first section of four-lane pavement is 46 feet in width, providing four 11-foot traffic lanes with a 2-foot dividing mark outlined with reflectors for night driving.

The construction of the two new lanes presented an interesting problem in that the road-bed was constructed over a peat flat with a fill of from 3 to 4 feet in depth. There was no opportunity to consolidate this section with traffic prior to the paving and therefore stabilization was resorted to, using Bitumulite H.R.M. 1 per cent. by weight disked into the run of the bank fill material to a depth of 3 inches and compacted by rolling. On this base was spread 3 inches (loose) of specified gravel to which was added 8 gallons per cubic yard of M.C. 1 asphalt. This was "road mixed" and then laid out and rolled, then capped with 2 inches compacted "plant mix"

vehicles east and south bound to proceed in one lane, while the other lane was reserved for faster moving traffic. This extension also served to further distribute the traffic for passing over the Pattullo Bridge. It is interesting to note here that on July 1st of this year for the first time traffic reached an all-time peak for the Pacific Highway since May, 1929. At that time the traffic became "jammed" at 7.30 in the evening and at one time reached back as far as Fry's Corner, a distance of 10 miles. With a similar volume of traffic, the record number of 3,000 cars passed through the toll-gates at the Pattullo Bridge in one hour on the first of July and at no time was there any line-up of cars.

However, with the decision to construct the Peace Arch Highway, described elsewhere in this Journal, the Department decided to extend the four-lane divided highway to the junction of the Trans-Canada and Peace Arch Highways. Tenders under the joint Provincial-Federal Works

TRAFFIC-LINE MARKER

(Continued from page 16.)

the truck. The truck is then run around in front of the painting-carriage, which is then lifted and the ring in front of frame is fastened to the conventional type draw-bar of the truck. The machine can then be towed at a good speed.

Any smooth - running low - geared truck of 1 to 1½ tons capacity may be used as a pusher truck, a tachometer and a very fine adjusting hand-throttle are installed. This makes it possible to maintain a steady speed which is absolutely essential.

A special type compressor is installed in the truck. It is a four-cylinder Model B Ford conversion, using two cylinders for compressing and two for power; all Ford parts are used on the motor except the head, which is made by Smith-Hewitt Co. Standard air equipment is used for unloading - valves, safety - valve, etc. The air receiver is made up of 8-inch hydraulic pipe which forms a base upon which the plant sits. The truck also carries a Binks 60-gallon paint-tank equipped with an air-driven agitator.

The machine requires three men to operate it, and 16 to 18 miles of single line can be painted a day at an average cost of \$27 per mile, including cost of paint.

It is of course necessary to have a truck stationed astride the centre line at such a distance behind the marker as to ensure that no vehicle crosses the newly painted line before it is dry. This truck bears a large sign at the rear "Pass on the right." The fresh line between the marker and the guardian truck is marked with small red flags at intervals of 150 feet.

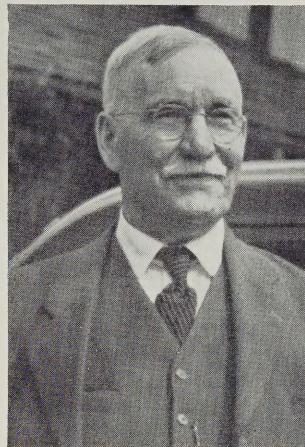
Thomas "T. K." Kilpatrick

In the death of Mr. Kilpatrick on June 24th last the Province lost one of its early pioneers and, until recently, a faithful and valuable servant of the Public Works Department. The sympathy of the entire Department will go out to Mrs. Kilpatrick and family.

Mr. Kilpatrick was born in Simcoe, Ontario, in 1858, and came out to British Columbia first in 1884. 1857

His entire life was spent in railway and road construction, specializing in bridge-work. He was associated with the firm of Armstrong & Morrison during the time that company was engaged in carrying out bridge construction for the C.P.R. in the Mountain Division, following which he was engaged by the C.P.R. in charge of a bridge crew in the Mountain Division.

One of Mr. Kilpatrick's great accomplishments during his service with the C.P.R. was his achievement in maintaining continuous service over the existing timber bridge, 196 feet



above the water, during the construction of the Stoney Creek steel-arch span. He was personally complimented by Sir William Van Horne, President

of the C.P.R. at that time, for his part in the work. In May, 1901, Mr. Kilpatrick was promoted to the position of Superintendent of the Mountain Division.

Mr. Kilpatrick retired from the railway service in 1912 and joined the service of the Provincial Government as Provincial Bridge Inspector in 1915, a position which he occupied until 1923, when he was appointed General Manager of the Pacific Great Eastern Railway, which position he held until the spring of 1927 when he returned to the Department of Public Works as Inspector of Bridges and Materials until his retirement on superannuation in 1934.

On June 24th of this year, having attained more than four-score years, our good friend "T. K." ended a life filled with active service to the public, a personality notable for countless kindly deeds, rigid adherence to upright principles, keen judgment of human character, appreciative of industry and sound workmanship, quick to condemn the unsound, and—above all—a staunch friend.

TRANS-CANADA HIGHWAY

(Continued from page 13.)

will no doubt set up his crushing and screening plant.

The accompanying plan shows the smooth alignment procured, and the maximum gradient is a short section of 4 per cent. at Hunter Creek.

The road-bed throughout the whole section will be up to the 38-foot standard with adequate superelevation on curves.

At Hunter Creek a new permanent bridge, similar to the one constructed over Jones Creek, is being built to replace the obsolete wooden King truss now in use.

The result of this season's work will be the opening of 4 miles of standardized highway which will replace 4.8 miles of narrow crooked road, the elimination of two level railway crossings, the abandonment of three obsolete wooden bridges (two at Jones Creek and one at Hunter Creek), and the advancement of a standardized highway to within 8 miles of the objective—the Village of Hope. Thus the fulfilment of a dream is gradually advancing and by October will only have 8 miles to go.

New Launch for West Coast Service

(Continued from page 5.)

structed and had generally outlived its usefulness to the Department.

The "Milwin" has an over-all length of 60 feet, breadth 15 feet 6 inches, draught 6 feet 9 inches, registered tonnage 25.21, and a speed of 9 knots per hour. The vessel is of sturdy construction, the frame consisting of 2½- by 3¼-inch ribs spaced to 9-inch centres and planking is 1¾-inch yellow cedar. The power plant is a 120-horse-power Vivian Diesel engine and a Ruston Lister Diesel auxiliary runs

the lighting plant, fire and bilge pumps, and air-compressor. The gallery is fitted with modern equipment. The pilot-house is equipped for one-man control and there is accommodation for six persons, exclusive of the crew which is comprised of an engineer and a deck-hand. The fuel-tanks have a capacity of 725 gallons and the engine consumes 5 gallons per hour, which gives the launch a cruising radius of approximately 1,200 miles. She is a sea-going vessel, perfect in every detail.

Design for an Express Highway

(Continued from page 8.)

On the main local roads grades should as far as possible follow the ground-line and may run up to 10 or 12 per cent. before cutting and filling is resorted to.

The maximum curvature on the whole should not exceed 5 degrees.

The width of right-of-way shown on the cross-section is of course a minimum; where cuts and fills occur the width would have to be increased to accommodate the same.

Overhead pedestrian crossings at closer intervals than the road crossings might under certain circumstances be necessary.

In this article it is impossible to treat the subject except in a general way, as each project would have a thousand details peculiar to itself.

* * *

That much explanation was necessary when an A.D.E. was overheard by his mother-in-law when he was telephoning thus: "All right, Darling, I'll meet you at the Lily Pond to-morrow at 5 and we'll see what's best to be done; have Blondie there, too." Darling is the Rosedale Foreman, the Lily Pond is at the foot of the hill near Jones Creek and Blondie is a shovel-runner.

